



U.S. Department
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**Federal Aviation
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Web Service Description Document

Federal NOTAM System (FNS)
NOTAM Distribution Service (FNS-NDS)

Web Service Description Document

Aeronautical Information Management Federal NOTAM System NOTAM Distribution Service (FNS-NDS)

Approval Signatures

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Participant	Name	Signature	Date Signed

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1 Scope

This Web Service Description Document (WSDD) was prepared in accordance with Federal Aviation Administration (FAA) Standard FAA-STD-065. It provides the design characteristics of the Federal NOTAM System (FNS) NOTAM Distribution Service (FNS-NDS), the web service interface for distributing NOTAMs. This WSDD satisfies the interface design requirements for the FNS-NDS requirements documented in the FNS-NDS Web Services Requirements Document (WSRD).

1.1 Background

Accurate, timely distribution of aeronautical information is critical to the safety and efficiency of the National Airspace System (NAS). The Federal NOTAM System (FNS) is a component of the NAS, and a centerpiece of the FAA's Aeronautical Information Management (AIM) Modernization plan. In order to accomplish this modernization, the FAA has reached out to stakeholders from different industries to create a modern digital NOTAM system designed to meet current and future customer needs. The FAA has also worked closely with EUROCONTROL in developing a common and harmonized distribution message based on AIXM to ensure a seamless process for the ingestion of NOTAMs (dynamic data) provided by the United States and countries throughout the world.

While the current legacy system also has a machine interface for distributing NOTAMs, the FNS-NDS offers numerous benefits including but not limited to: a) uses Open Geospatial Consortium (OGC) Web Feature Service (WFS) 2.0 with FES 2.0 as the framework for distributing NOTAMs; b) uses AIXM as the message payload c) schema used is harmonized between both FAA and EUROCONTROL. Digital data including geometries of the affected features are only available for NOTAMs originated or transformed by the FNS. NOTAMs not originated through FNS are still included in FNS-NDS, but only contain limited data provided from the legacy system.

FNS-NDS is a SOAP standards-compliant web service intended for external systems to query and use it accordingly within their data systems. The query syntax is based on OGC's Web Feature Service (WFS) 2.0 Interface Standard. Details on this standard can be obtained from <http://www.opengeospatial.org/standards/wfs>.

The purpose of this document is to describe the FNS-NDS interface and provide the procedure for accessing this service. This document should be used along with the NOTAM scenario analysis documents, referenced in Section 2, to build the client interface.

2 Applicable Documents

2.1 Government Documents

The following documents form a part of this WSDD to the extent specified here in.

FAA STANDARDS:

FAA-STD-063 May 1, 2009	Standard Practice, XML Namespaces
FAA-STD-065 February 26, 2010	Standard Practice, Preparation of Web Service Description Documents
FAA-STD-066 February 26, 2010	Standard Practice, Web Service Taxonomies

OTHER FAA PUBLICATIONS:

October 20, 2011	JO 7930.2 Change M – Notices to Airmen
December 20, 2012	Federal NOTAM System General Rules for All Event Scenarios
December 20, 2012	Federal NOTAM System Airport Operations Event Scenarios
December 20, 2012	Federal NOTAM System FAA Technical Operations Event Scenarios
December 20, 2012	Federal NOTAM System Tower Light Outage Event Scenarios
January 2013	Federal NOTAM System NOTAM Distribution Service (FNS-NDS) Web Service Requirements Document (WSRD)
April 28 2009	SWIM Governance Policies v0.8
FAA Order 1375.1d	SWIM Service Software Requirements

2.2 Non-Government Documents

STANDARDS:

Aeronautical Information Exchange Model 5.1 Specification February 01, 2010	http://www.aixm.aero/public/standard_page/download_5_0.html
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Internet Engineering Task
Force (IETF) Request for
Comments (RFC) 791
September 1981

Internet Protocol (IP) as updated by RFC 1349

IETF RFC 2246
January 1999

Transport Layer Security (TLS) – version 1.0

IETF RFC 2616
June 1999

Hypertext Transfer Protocol – HTTP/1.1

IETF RFC 793
September 1981

Transmission Control Protocol (TCP), updated by RFC 3168

IETF INTERNET-DRAFT
November 18, 1996

The Secure Sockets Layer (SSL) Protocol Version 3.0

OGC 09-025r1 and ISO/DIS
19142

OpenGIS Web Feature Service 2.0 Interface Standard

November 2, 210

<http://www.opengeospatial.org/standards/wfs>

OASIS WS-Security Core
Specification 1.1

<https://www.oasis-open.org/committees/download.php/16790/wss-v1.1-spec-os-SOAPMessageSecurity.pdf>

OASIS UDDI v. 3.0.2
October 19, 2004

Universal Description, Discovery, and Integration (UDDI)
Standard, version 3.0.2

Digital NOTAM Event
Specification

http://www.aixm.aero/public/standard_page/digital_notam_specifications.html

W3C SOAP v. 1.2, Pt. 1
Recommendation
April 27, 2007

SOAP Version 1.2 Part 1: Messaging Framework (Second
Edition)

W3C WSDL v. 2.0
June 26, 2002

World Wide Web Consortium Web Services Description
Language (WSDL) version 2.0

W3C XML Recommendation
September 29, 2006

World Wide Web Consortium Extensible Markup Language (XML)
version 1.0, fourth edition.

3 Definitions and Acronyms

AIXM	Aeronautical Information Exchange Model
FAA	Federal Aviation Administration
FES	Filter Encoding Standard
FNS	Federal NOTAM System
HTTP	Hypertext Transport Protocol
HTTPS	Hypertext Transfer Protocol Secure
ICAO	International Civil Aviation Organization
MOA	Memorandum of Agreement
NAS	National Airspace System
NOTAM	Notice to Airmen
OGC	Open Geospatial Consortium
SOAP	Simple Object Access Protocol
UTC	Coordinated Universal Time
UUID	Universally unique identifier
WFS	Web Feature Service
WSDL	Web Service Definition Language

4 Web Service Properties and Capabilities

This section contains the information needed to discover and use the NOTAM Distribution Service (FNS-NDS). FNS-NDS provides a machine query interface that external systems can use to obtain the latest NOTAM data published in the NAS.

FNS-NDS uses OGC's WFS 2.0 with FES 2.0 as the query framework. The message payload is provided in AIXM 5.1. FNS implements digital NOTAMs using the concept of scenarios. Scenario refers to a set of properties used to represent the NOTAM event. It also includes the associated business rules, mapping to the AIXM data model and the rules for transformation into the various NOTAM formats. Details on the FNS NOTAM scenarios can be found in the analysis documents included in the reference section. FNS-NDS is a generic interface and can be used for all the scenarios defined in this document. Within this generic framework, a NOTAM scenario is communicated by using the scenario specific AIXM message with the appropriate event elements populated.

4.1 Service Profile

The FNS NOTAM Distribution Service (FNS-NDS) is a web-service interface for querying NOTAMs. It supports all NOTAMs published in the US. The digital NOTAMs are implemented using the concept of scenarios.

The namespace for the service is: <http://www.faa.gov/aim/fns/1.0>

The service version is version 1, and the service category according to FAA_STD-066 is Air Transportation System Service (1.5.3). The NOTAM Distribution Service is in the Production lifecycle stage and is in the Essential category per FAA_STD-066.

4.1.1 Service Provider

The FNS NOTAM Distribution Service (FNS-NDS) is provided by the Aeronautical Information Management directorate (AIM). AIM is the authoritative source under FAA for collecting, validating, storing, maintaining, and disseminating aeronautical data concerning the United States and its territories to support real-time aviation activities.

4.1.1.1 Point of Contact

Diana Young

Chief Engineer, AIM (AJV-2)

diana.young@faa.gov; 202-538-5200

4.1.2 Service Consumers

This service is available for all NOTAM consumers, which could include but not limited to DOD, Airlines, third-party developers and other users interested in maintaining a database of the latest NOTAMs issued by the FAA.

4.1.3 Service Functionality

FNS NOTAM Distribution Service (FNS-NDS) provides a web-service interface for querying NOTAMs. The main functions of this service is providing a standards based query interface to allow NOTAM consumers to obtain latest NOTAM data from the FAA.

4.1.3.1 Security

Access to all operations supported by FNS-NDS requires a valid user account and password. User credentials to the service are provided in the SOAP header following the OASIS WS-Security core specification 1.1. In addition all data transmission between the client and the FNS servers are encrypted through SSL.

4.1.3.2 Roles

FNS-NDS has only one role for querying data.

4.1.3.3 Access Control Mechanisms

The NOTAM Distribution Service will restrict access to its web services through user authentication on each service call. A username/password combination will be contained in the SOAP header in each request to the service.

4.1.3.4 Security Policies

Only authorized users can use FNS-NDS. Requests for User accounts can be made through the FNS-NDS web application. Each request will be reviewed and approved by the FAA. The user of FNS-NDS will be required to sign a standard memorandum of agreement (MOA) for the service with FAA. All signed copies of the MOA should be sent to fns@faa.gov. Any questions related to the MOA can also be sent to fns@faa.gov. The FAA reserves the right to terminate access to the service, if the user does not comply with the terms of the MOA.

4.1.4 Qualities of Service

The FNS NOTAM Distribution Service meets the following quality of service parameters:

Table 4-1
FNS-NDS Quality of Service Parameters

QoS Parameter	Definition	Value
Availability	A measure of the lowest probability that a system or constituent piece will be operational during any randomly selected period of time, or, alternatively, the fraction of the total available operating time that the system or constituent piece is operational.	.9975

4.1.5 WSDL Document

The FNS-NDS is a SOAP compliant web-service interface that provides operations for querying NOTAMs. Details of the service can be obtained from the WSDL given below.

<http://notamdemo.aim.nas.faa.gov/notamWFSservices/NOTAMDistributionService?wsdl>

4.2 Service Interfaces

In this section, the interface characteristics that include the data elements, the message patterns and any other information required to interface with the FNS-NDS service are described. FNS-NDS currently supports at a high level two operations listed below.

- GetCapabilities
- GetFeature

GetCapabilities is a discovery request, which provides information related to the options provided by the FNS-NDS Web Feature Service. GetFeature query provides seven different operations listed below.

- Search by FNS Unique Reference Identifier (also called as Transaction Id)
- Search by Location Designator (Affected Facility Identifier)
- Search by NOTAM Accountability
- Free-Text Search
- Search by Latitude, Longitude and Radius
- Get all active NOTAMs (Bulk Request)
- Get NOTAMs from a given date and time in UTC (Last Update Date)

4.2.1 Types

The data elements (types) used in the request and response messages of the FNS-NDS are provided in tables 4-2 and 4-3. All the possible request message data elements are described in table 4-2 and the response message is described in table 4-3.

Table 4-2
Query Request for FNS-NDS

Name	Definition	Occurrence	Obligation
User credentials are passed in the SOAP Header request			
Username	FNS-NDS user name	1	Required
Password	FNS-NDS Password	1	Required
The following are input for GetFeature Query corresponding to the seven query operations			
ResourceId	Query by the FNS Unique Reference identifier to obtain the specific NOTAM transaction.	1	Required

SearchByDesignator	Query by US domestic designator of the affected facility for the NOTAM. All active NOTAMs for this affected facility will be provided in the response message	1	Required
SearchByDesignator	Query by US FAA NOTAM Accountability. All active NOTAMs for this accountability will be provided in the response message.	1	Required
SearchByLatLong	Query for NOTAMs in a circle by providing the coordinates and the radius in nautical miles (NM). All active NOTAMs within this circle will be provided in the response message.	1	Required
BulkRequest	Query to get all active NOTAMs in the country. Input to the filter should be the NOTAM Type. The various NOTAM Types are: <ul style="list-style-type: none"> • Domestic NOTAM • FDC NOTAM • Military NOTAM • International NOTAM 	1	Required
SearchByLastUpdate Date	Query to get all the changes (new and cancelled) from a specific date. The system will provide only data within the past 72 hours.	1	Required

The response message for all the Query operations is a feature collection of multiple AIXMBasicMessage members, with each member representing the individual NOTAM contained in the response. The FeatureCollection element includes the total number of NOTAMs included in the message as shown in Figure 4-1 below.

Figure 4-1
Snippet of FNS-NDS response message

```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
  <soap:Body>
    <ns3:FeatureCollection timeStamp="2012-12-27T15:03:38.213-05:00" numberMatched="39" numberReturned="39"
      xmlns:ns1="http://www.opengis.net/ows/1.1" xmlns:ns2="http://www.w3.org/1999/xlink"
      xmlns:ns3="http://www.opengis.net/wfs/2.0" xmlns:ns4="http://www.opengis.net/fes/2.0"
      xmlns:ns5="http://www.opengis.net/gml/3.2" xmlns:ns6="http://www.aixm.aero/schema/5.1"
      xmlns:ns7="http://www.isotc211.org/2005/gco" xmlns:ns8="http://www.isotc211.org/2005/gmd"
      xmlns:ns9="http://www.isotc211.org/2005/gts" xmlns:ns10="http://www.faa.gov/aim/fns/1.0"
      xmlns:ns11="http://www.aixm.aero/schema/5.1/event"
      xmlns:ns12="http://www.aixm.aero/schema/5.1/extensions/FAA/FNSE" xmlns:ns13="http://www.aixm.aero/schema/5.1/message">
```

The specific content of the AIXM message differs based on the scenario. The scenario analyses document contains the details of the scenarios supported by FNS and should be used in conjunction with this document to build an NDS client. The only common element in all the NOTAM messages is the “event” element. Details of the event element are provided in Table 4-3.

Table 4-3
Event element details of the FNS-NDS Response Message

Name	Definition
beginPosition	Start date/time of the NOTAM in UTC
endPosition	End date/time of the NOTAM in UTC
interpretation	AIXM Temporality model attribute. Possible values: <ul style="list-style-type: none"> • BASELINE • TEMPORARY
Location	Location (FIR)
accountId	Account Id
Name	Name of the airport
series	NOTAM series value per ICAO Annex-15
number	NOTAM number value per ICAO Annex-15
year	NOTAM year values per ICAO Annex-15
type	NOTAM type value per ICAO Annex-15
issued	NOTAM issue date value per ICAO Annex-15
selectionCode	Q Code value for the NOTAM
location	Location (designator) of the affected facility
effectiveStart	Start date/time of the NOTAM in UTC in YYYYMMDDHH24MI format
effectiveEnd	End date/time of the NOTAM in UTC in YYYYMMDDHH24MI format
cancelDate	Cancel Date
text	NOTAM Condition text
type: LOCAL_FORMAT	NOTAM in domestic format
type: OTHER: ICAO	NOTAM in ICAO format
Schedule	Schedule
lowerLimit	Lower Limit
upperLimit	Upper Limit
xoveraccountId	Xover Account Id
xovernotamId	Xover NOTAM Number
originId	Origin Id
notamnumber	Legacy NOTAM number

4.2.1.1 Errors & Exceptions

Requests resulting in errors or exceptions will be provided as a WFS ServiceExceptionReport. The list of error/exception statuses is listed in table 4-4 below.

Table 4-4
FNS-NDS List of Errors/Exceptions

Error/Exception	Description
USER_AUTHORIZATION_ERROR	User credentials incorrect. Use the FNS-NDS web interface to reset the password.
DATA_VALIDATION_ERROR	Input Data is not valid. For example, when doing search by last update date, if the last update is past the 72 hours of the current date and time, this error will be returned.
NDS_SYSTEM_ERROR	Potential network/hardware error. Contact FNS helpdesk for further details.

4.2.2 Messages

FNS-NDS follows the request/response pattern of service. All requests to FNS-NDS have to be initiated by the client and every successful request is provided with a response. FNS-NDS provides with one GetFeature interface for query. Within this interface, it supports seven different queries as described in previous sections. In the table 4-5 below, the various query operations are described in detail.

Table 4-5
Messages supported by FNS-NDS

Name	Definition
ResourceID	Query by FNS Unique Transaction/Reference identifier. Response will include only one NOTAM corresponding to the transaction identifier.
SearchByDesignator	Query by US domestic location identifier. Response will include all active NOTAMs for the given identifier.
SearchByAccountability	Query by US NOTAM Accountability. Response will include all active NOTAMs for the given NOTAM accountability.
SearchByLatLong	Query using location coordinates in decimal degrees and radius in nautical miles. Active NOTAMs contained within the circle will be included in the response message.
BulkRequest	Query to get all current active NOTAMs. FNS-NDS SHALL limit the user to run this query once in 24 hours if it is determined it can cause adverse impact to the system OR to other users of the system. The bulk request also include a type filter as listed below: <ul style="list-style-type: none"> F - FDC NOTAMs

	<ul style="list-style-type: none"> • D- Domestic NOTAMs • I - International NOTAMs • M - Military NOTAMs • L - Local Military NOTAMs
SearchByLastUpdateDate	Query to get all changes to NOTAMs that include new active and cancelled NOTAMs are provided from a given date and time in UTC. For this query, the system SHALL limit queries to be within the past 72 hours. The user shall be limited to one query in 5 minutes.
Search By Location and NOTAM Number	Query to get the NOTAM by location and NOTAM Number
Free Text Search	Free text query search

4.2.3 Operations

This section provides the details of the operations supported by the NOTAM Distribution Service (FNS-NDS) in accordance with the requirements of FAA-STD-065.

Table 4-6
GetFeature-ResourceID query

Operation Name	ResourceID
Description	Allows for query by FNS unique reference identifier
MEP	In-Out
Precondition	Only authorized users can query the system. Valid reference identifier is a requirement for this request. Invalid reference identifier will be returned with an error message. The user is limited to one query in 5 minutes. This is to ensure the multiple queries by the same user do not negatively impact other users of the system.
Input	GetFeature query with ResourceID query.
Output	FeatureCollection response with AIXMBasicMessage
Effect	Upon success, NOTAM with the given reference identifier will be returned.
Faults	As described in section 4.2.1.1, the system will respond with errors/exception using the WFS ServiceExceptionReport.

Table 4-7
GetFeature-SearchByDesignator query

Operation Name	SearchByDesignator
Description	Allows for query by US domestic facility designator
MEP	In-Out
Precondition	Only authorized users can query the system. Valid US domestic facility designator is a requirement for this request. The user is limited to one query in 5 minutes. This is to ensure the multiple queries by the same user does not negatively impact other users of the system.
Input	GetFeature query with SearchByDesignator query.
Output	FeatureCollection response with AIXMBasicMessage
Effect	Upon success, all active NOTAMs for the given designator will be returned.
Faults	As described in section 4.2.1.1, the system will respond with errors/exception using the WFS ServiceExceptionReport.

Table 4-8
GetFeature-SearchByAccountability query

Operation Name	SearchByAccountability
Description	Allows for query by US NOTAM Accountability
MEP	In-Out
Precondition	Only authorized users can query the system. Valid US accountability designator should be used. Invalid accountability designator will be returned with an error message. The user is limited to one query in 5 minutes. This is to ensure the multiple queries by the same user does not negatively impact other users of the system.
Input	GetFeature query with SearchByAccountability query.
Output	FeatureCollection response with AIXMBasicMessage
Effect	Upon success, all active NOTAMs for the given NOTAM Accountability will be returned.
Faults	As described in section 4.2.1.1, the system will respond with errors/exception using the WFS ServiceExceptionReport.

Table 4-9
GetFeature-SearchByLatLong query

Operation Name	SearchByLatLong
Description	Geography search
MEP	In-Out
Precondition	Only authorized users can query the system. Valid location identifier should be used. Also, the radius should be greater than 0 and less than 100 nautical miles. The user is limited to one query in 5 minutes. This is to ensure the multiple queries by the same user does not negatively impact other users of the system.
Input	GetFeature query with SearchByLatLong query.
Output	FeatureCollection response with AIXMBasicMessage
Effect	Upon success, all active NOTAMs that are contained with the circle formed by the coordinates with the given radius will be returned.
Faults	As described in section 4.2.1.1, the system will respond with errors/exception using the WFS ServiceExceptionReport.

Table 4-10
GetFeature-BulkRequest query

Operation Name	BulkRequest
Description	Allows getting all active NOTAMs in US.
MEP	In-Out
Precondition	Only authorized users shall be authorized to query the system. This query will return only active NOTAMs at the time the request is received by the server. Also, this operation limits one query in a 24-hour period. This is to limit the impact of repeated bulk queries by the same user potentially impacting other users.
Input	GetFeature query with BulkRequest query.
Output	FeatureCollection response with AIXMBasicMessage
Effect	Upon success, all active NOTAMs at the time query is received by the system will be returned.
Faults	As described in section 4.2.1.1, the system will respond with errors/exception using the WFS ServiceExceptionReport.

Table 4-11
GetFeature-SearchByLastUpdateDate query

Operation Name	SearchByLastUpdateDate
----------------	------------------------

Description	Allows getting all changes to NOTAMs from given date
MEP	In-Out
Precondition	Only authorized users can query the system. This query will return all changes (new active and cancelled) of NOTAMs. This date cannot be less than 72 hours from the current date and time in UTC. The user is limited to one query in 5 minutes. This is to ensure that multiple queries by the same user do not negatively impact other users of the system.
Input	GetFeature query with SearchByLastUpdateDate query.
Output	FeatureCollection response with AIXMBasicMessage
Effect	Upon success, all active and cancelled NOTAMs from the provided time till now will be provided by the system as response.
Faults	As described in section 4.2.1.1, the system will respond with errors/exception using the WFS ServiceExceptionReport.

4.2.4 List of Interfaces

This section provides an abstraction of the interfaces provided by the NOTAM Distribution Service (FNS-NDS).

Table 4-13
List of FNS-NDS Interfaces

Name	Definition	Operations
FNS-NDS GetFeature	Main method for querying NOTAMs. Provides seven operations.	<ul style="list-style-type: none"> ResourceID SearchByDesignator SearchByAccountability SearchByLatLong BulkRequest SearchByLastUpdateDate
FNS-NDS GetCapabilities	This interface is useful for exploring/discovering the service.	

4.3 Service Implementation

The FNS-NDS is a SOAP compliant web-service interface that provides operations for querying NOTAM. OGC's WFS 2.0 standard is used for query and filtering. AIXM (Aeronautical Information Exchange Model) 5.1 is the payload for the WFS response. AIXM is the accepted global standard for exchanging aeronautical information. More

details on AIXM can be found at
http://www.aixm.aero/public/subsite_homepage/homepage.html

FNS-NDS will be hosted with all other FNS applications in the internal gateway architecture of the NAS Enterprise Security Gateway (NESG) at the Mike Monroney Aeronautical Center in Oklahoma City. The backup/disaster recovery site while not available as of this writing will be hosted at the William J. Hughes Technical Center in Atlantic City.

4.3.1 End Points

The following sections describe the associated interface, communication protocol, messaging protocol, and network address.

4.3.1.1 FNS-NDS End Point

4.3.1.1.1 Associated Interface

For all FNS-NDS Service end points, the interface name is NOTAMDistributionService.

4.3.1.1.2 Communication Protocol

For all FNS-NDS Service end points, the communications protocol is HTTPS.

4.3.1.1.3 Messaging Protocol

For all FNS-NDS Service end points, the messaging protocol is SOAP.

4.3.1.1.4 Network Address

All FNS applications and services including FNS-NDS are made available through the main URL, <https://notams.aim.faa.gov>. Using the WSDL the specific details of the service can be obtained.